

CLAIMS

What is claimed is:

1. A melt-cast explosive composition comprising:

at least one binder comprising at least one member selected from the group consisting of mononitro-substituted arenes and dinitro-substituted arenes;

at least one processing aid comprising at least one member selected from the group consisting of N-alkylnitroanilines and N-arylnitroanilines, the at least one processing aid and the at least one binder forming a mixture having a melting temperature in a range of from about 80°C to about 110°C;

oxidizer particles having particle diameters in a range of from about 20 μm to about 600 μm ; and

at least one energetic filler having particles sizes in a range of from about 2 μm to about 10 μm , wherein the melt-cast explosive composition is melt-pourable at at least one temperature in the range of from about 80°C to about 110°C.

2. The melt-cast explosive composition of claim 1, wherein the at least one binder comprises at least one member selected from the group consisting of nitrotoluenes, dinitrotoluenes, and dinitronaphthalenes.

3. The melt-cast explosive composition of claim 1, wherein the at least one binder is further substituted and comprises at least one member selected from the group consisting of nitrophenols, dinitrophenols, mononitroanilines, and dinitroanilines.

4. The melt-cast explosive composition of claim 1, wherein the at least one energetic filler comprises at least one member selected from the group consisting of 1,3,5-trinitro-1,3,5-triaza-cyclohexane (RDX), 1,3,5,7-tetranitro-1,3,5,7-tetraazacyclooctane (HMX), 2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexaazatetracyclo[5.5.0.0^{5,9}0^{3,11}]dodecane (HNTW), 4,10-dinitro-2,6,8,12-tetraoxa-4,10-diazatetracyclo[5.5.0.0^{5,9}0^{3,11}]dodecane (TEX), nitroguanidine (NQ), 1,3,5-triamino-2,4,6-trinitrobenzene (TATB), 1,1-diamino-2,2-dinitroethane (DADNE), 1,3,3-trinitroazetidine (TNAZ), and 3-nitro-1,2,4-triazol-5-one (NTO).

5. The melt-cast explosive composition of claim 1, wherein the oxidizer particles comprise at least one member selected from the group consisting of inorganic perchlorates and inorganic nitrates.

6. The melt-cast explosive composition of claim 5, wherein the at least one energetic filler comprises 1,3,5-trinitro-1,3,5-triaza-cyclohexane (RDX).

7. The melt-cast explosive composition of claim 6, wherein the at least one processing aid comprises at least one N-alkyl-nitroaniline.

8. The melt-cast explosive composition of claim 6, wherein the at least one processing aid comprises N-methyl-nitroaniline.

9. A melt-cast explosive composition comprising:
at least one binder comprising at least one member selected from the group consisting of mononitro-substituted arenes and dinitro-substituted arenes, the at least one binder being free of -NH₂ functionalities;
at least one processing aid comprising at least one member selected from the group consisting of N-alkylnitroanilines and N-arylnitroanilines, the at least one processing aid is different than the at least one binder and combines with the at least one binder to form a mixture having a melting temperature in a range of from about 80°C to about 110°C;
oxidizer particles having particle diameters in a range of from about 20 μm to about 600 μm; and

at least one energetic filler having particle sizes in a range of from about 2 μm to about 10 μm , wherein the melt-cast explosive composition is melt-pourable at at least one temperature in the range of from about 80°C to about 110°C.

10. The melt-cast explosive composition of claim 9, wherein the at least one processing aid accounts for about 0.15 weight percent to about 1 weight percent of a total weight of the melt-cast explosive composition.

11. The melt-cast explosive composition of claim 9, wherein the at least one binder accounts for 25 weight percent to 45 weight percent of a total weight of the melt-cast explosive composition.

12. The melt-cast explosive composition of claim 9, wherein the at least one binder accounts for 30 weight percent to 40 weight percent of a total weight of the melt-cast explosive composition.

13. The melt-cast explosive composition of claim 9, wherein the at least one binder comprises at least one member selected from the group consisting of nitrotoluenes, dinitrotoluenes, and dinitronaphthalenes.

14. The melt-cast explosive composition of claim 9, wherein the at least one binder is further substituted and comprises at least one member selected from the group consisting of nitrophenols, dinitrophenols, mononitroanilines, and dinitroanilines.

15. The melt-cast explosive composition of claim 9, wherein the at least one energetic filler comprises at least one member selected from the group consisting of 1,3,5-trinitro-1,3,5-triaza-cyclohexane (RDX), 1,3,5,7-tetranitro-1,3,5,7-tetraazacyclooctane (HMX), 2,4,6,8,10,12-hexanitro-2,4,6,8,10,12-hexaazatetracyclo[5.5.0.0^{5,9}0^{3,11}]dodecane (HNIW), 4,10-dinitro-2,6,8,12-tetraoxa-4,10-diazatetracyclo[5.5.0.0^{5,9}0^{3,11}]dodecane (TEX), nitroguanidine (NQ), 1,3,5-triamino-2,4,6-trinitrobenzene (TATB), 1,1-diamino-2,2-dinitroethane (DADNE), 1,3,3-trinitroazetidine (TNAZ), and 3-nitro-1,2,4-triazol-5-one (NTO).

16. The melt-cast explosive composition of claim 9, wherein the oxidizer particles comprise at least one member selected from the group consisting of inorganic perchlorates and inorganic nitrates.

17. The melt-cast explosive composition of claim 16, wherein the at least one energetic filler comprises 1,3,5-trinitro-1,3,5-triaza-cyclohexane (RDX).

18. The melt-cast explosive composition of claim 17, wherein the at least one processing aid comprises at least one N-alkyl-nitroaniline.

19. The melt-cast explosive composition of claim 17, wherein the at least one processing aid comprises N-methyl-nitroaniline.